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TO THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

CRUSTAL DYNAMICS PROJECT

NASA GRANT NAG 5-814

"The Interpretation of Crustal Dynamics Data in Terms of Plate
Motions and Regional Deformation Near Plate Boundaries"

for the period
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SUMMARY OF ACCOMPLISHMENTS UNDER THE CRUSTAL DYNAMICS PROJECT

During our participation in the NASA Crustal Dynamics Project under NASA contract NAS-27339 and grant NAG5-814 for the period 1982-1991, we published or submitted for publication 30 research papers and 52 abstracts of presentations at scientific meetings. In addition, five M.I.T. Ph.D. students (Eric Bergman, Steven Bratt, Dan Davis, Jeanne Sauber, Anne Sheehan) were supported wholly or in part by this project during their thesis research. A full list of these publications follows.

Highlights of our research progress during this period include the following:

- (i) Application of geodetic data to determine rates of strain in the Mojave block and in central California and to clarify the relation of such strain to the San Andreas fault and Pacific-North American plate motions.
- (ii) Application of geodetic data to infer postseismic deformation associated with large earthquakes in the Imperial Valley, Hebgen Lake, Argentina, and Chile.
- (iii) Determination of the state of stress in oceanic lithosphere from a systematic study of the centroid depths and source mechanisms of oceanic intraplate earthquakes.
- (iv) Development of models for the state of stress in young oceanic regions arising from the differential cooling of the lithosphere.
- (v) Determination of the depth extent and rupture characteristics of oceanic transform earthquakes.
- (vi) Improved determination of earthquake slip vectors in the Gulf of California, an important data set for the estimation of Pacific-North American plate motions.
- (vii) Development of models for the state of stress and mechanics of fold-and-thrust belts and accretionary wedges.
- (viii) Development of procedures to invert geoid height, residual bathymetry, and differential body wave travel time residuals for lateral variations in the characteristic temperature and bulk composition of the oceanic upper mantle.

(ix) Initial GPS measurements of crustal deformation associated with the Imperial-Cerro Prieto fault system in southern California and northern Mexico.

Full descriptions of the research conducted on these topics may be found in the Semi-Annual status Reports submitted regularly to NASA over the course of this project and in the publications listed on the following pages.

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